Impact of macroeconomic variables on shariah stock markets: evidence from Malaysia based on ARDL approach

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Abstract

The Financial crises have destabilized the economy and have impacted the lives of millions of people across the world. The Financial crises have shown that Islamic capital market may be immune to crises. This has increased the demand for Islamic capital products. The increasing popularity of Islamic capital market from Muslim Investors and Non-Muslim investors has expanded Islamic capital market across the globe. However, the literature on Islamic Shariah capital market products are thin. Literature on capital market of emerging market is also thin. Therefore, this paper attempts to fill the gap in the literature by examining Islamic Shariah capital market link with macroeconomic variables for an emerging market. The paper attempts to investigate whether Islamic Shariah products provide stability for the financial system. The paper examines this by examining long-term cointegrating relationship between Shariah Index and four selected macroeconomic variables. The standard time series techniques are used and Malaysia is used as a case study. The result of ARDL model shows that Sharia Index and four selected macroeconomic variables; Money Supply, Exchange Rate, Oil Price and Interest rate have a long term cointegrating relationship. The Result of ECM shows that Oil price and interest rate have long-term relationship between sharia indexes in Malaysia. The result of VDC shows that Money Supply and Oil price are the driving forces of Shariah Index in Malaysia. These results show that Islamic capital market is also not immune to the financial crises. However, the risk and return principles embodied in Islamic financial products give stability to the economy. The result of this research shows that policy makers can predict the direction of the economy from Shariah Index in Malaysia

Keywords: Shariah stock market, Macroeconomic variables, ARDL,VECM, VDC, Malaysia

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1- Introduction, The issue motivating this paper

Stock market of countries play important role of connecting investors and savers. Efficient stock market is essential for smooth running of financial system of a country. The stock market stabilizes the economy by pooling, circulating and diversifying the domestic funds into investments that leads to prosper the economy of the country (Arestis, Demetriades and Luintel, 2001).

The Malaysia stock exchange has a market capitalization of RM1.66 trillion as at 30th June 2015 (Bursa Malaysia, 2015). The average Stock Market capitalization as a percentage of GDP from 1998 to 2012 was at 156.2% (World Bank, 2015). Islamic Finance as emerged as an alternative to conventional finance. Malaysia's Islamic finance sector has experienced tremendous growth. Today the number of Shariah-compliant securities traded at Bursa Malaysia is 674 as at June 2015. This is 74.5% of total listed securities at Bursa Malaysia. The total Shariah compliant market capitalization as at June 2015 is at RM 1,659.02 billion. This is 61.6% of total market capitalization (Securities Commission Malaysia, 2015). Therefore it is anticipated that what happens in stock market has a huge effect on the economy and the people. The financial crises like Subprime loan mortgage crisis 2008 and Asian Financial crisis 1997 has shown that collapse of stock market can cause wide spread economic disruptions.

During Subprime loan mortgage crisis 2008 and Asian Financial crisis 1997 stocks performed poorly around the world. It is argued that financial crises have less impact on Shariah compliant stocks. It is also argued that Sharia compliant stocks should be promoted to avoid financial crises and to ensure smooth running of financial systems. There are conflicting results on the research on performance of Shariah compliant stocks and how Shariah compliant stocks can help to avoid crisis more than conventional stocks. Abbes (2012) research argues that difference in performance between conventional stocks and Shariah compliant stocks are minimal. The McGowan and Muhammad (2010) research argues that conventional stocks outperform Shariah compliant stocks. However there are limited literatures on whether macroeconomic variables have an impact on the Shariah compliant stocks and whether Shariah compliant stocks help to prevent financial crises. Therefore, this paper extends the literature on the debate by examining the impact that macroeconomic variables have on sharia compliant stocks.

There are many empirical literatures on the relationship between stocks market and macroeconomic variables. The impact that macroeconomic variables have on conventional stocks in developed countries are well documented in the literature. Among these researches Fama (1981), Al-Jafari, Salameh, and Habbash (2011) and Kim, McKenzie and Faff (2004), have documented the relationship between macroeconomic variables and stock market in developed countries. There are few empirical literatures on the impact of macroeconomic variables on stock market of emerging markets or developing countries. Among these researches Naka, Mukherjee and Tufte (1998) researched for India, Maysami, Howe and Hamza (2004) researched for Singapore, Gay (2008) researched for Brazil, Russia, India and China and Gan, et. al., (2006) researched for New Zealand market have established relationship between conventional stocks and macroeconomic variables. In Malaysia context few literatures are available. Among them Ibrahim (2000), Ibrahim and Yusoff (2001), Baharom, Royfaizal and Habibullah (2008), Rahman, Sidek, and Tafri (2009), Ooi, et. al., (2009) Abdullah, Saiti and Masih (2014) researched the causality between stock market index and macroeconomic variables in Malaysia and Bekher and Mugableh (2012) have documented relationship between macroeconomic variables and conventional stock markets. Even though Malaysia is the largest Islamic financial economy that has introduced Shariah index, very few literatures have been documented. Among few available Hussin, et., al. (2012), researched the impact of oil price shocks on Islamic financial market in Malaysia, Hussin, et., al., (2012), researched the relationship between oil price, exchange rate and Islamic stock market in Malaysia and Mobin and Masih (2014) have researched the impact that macroeconomic variables have on Islamic bank deposits of Malaysia. Therefore this study fills the gap in the literature by examining the impact of macroeconomic variables has on the Islamic shariah index.

Due to the crucial role that stock market plays in stabilizing the economy and due to the impact that destabilize economy have on the people, it is important to study the factors that affect the stock market. Islamic Finance has emerged as an alternative to conventional finance. This paper is different from previous studies because the paper studies Shariah compliant index relationship with macroeconomic variables. Unlike other studies, the paper takes more variables and examines the long-term relationship with macroeconomic variables and Shariah index using ARDL model.

The paper examines the relationship between Shariah compliant stock market and Macroeconomic variables. The FTSE Bursa Malaysia Emas Shariah Price Index is taken as a proxy for Malaysia Sharia stock market. The selected macroeconomic variables for the research are Money Supply 2, Exchange Rate, crude oil and interest rate. The paper uses ARDL model to establish the relationship

between Shariah Index and selected macroeconomic variables. The results show that there is a long-term relationship between Shariah Index and Money Supply 2, Exchange Rate, crude oil and interest rate. The paper also uses ECM, VDC and Impulse Response tests. The results found that Money Supply and Oil price are the driving force of Shariah Index in Malaysia. The results show that all four macroeconomic variables; Money Supply 2, Oil price, exchange rate and Interest rate have long term relationship with Shariah Index. The results further show that Oil price and interest rate (KLIBOR) has a short term relationship with Sharia Index in Malaysia.

This paper studies the impact of macroeconomic variables on Islamic stock market of Malaysia. The paper takes five macroeconomic variables and FTSE Bursa Malaysia EMAS Shariah Price Index to analyze the relationship between the macroeconomic variables and the Islamic stock market prices. The five macroeconomic variables that the paper takes into consideration are Crude Oil price WTI spot Cushing US$/BBL-DS price , exchange rate; Malaysian Ringgits to 1 US$ market rate EP, Money Supply; M2 (EP) and Interest Rate; Kuala Lumpur Interbank Offer Rate (KLIBOR). First part of the paper focus on the background of the study, problem statement, motivation of the study. The second part of the paper reviews literature on factors affecting stock market. The third part of the paper describes the data. The fourth part of the paper develops research methodology. The fifth part of the paper discusses the results and policy implications. This is followed by a conclusion.

2- Literature Review

The linkages between stock market and macroeconomic variables have been explored by many researches. Due to the impact that stock market have on the economy many researches have been interested in exploring the topic for decades. Many early studies have been done on linkage between conventional stocks and macroeconomic variables. Among early studies Geske and Roll (1983) has examined the relationship between interest rate and stock market returns. The study applies Granger Causality test. It is been revealed by the study that stock market return are negatively related to both expected and unexpected change in interest rates.

The linkage between stock market and macroeconomic variables can be established from various researches. Among them Bernanke and Kuttner (2004) research shows how asset prices are affected from the changes in United States government monetary policy. The study applies vector auto regression (VAR) to calculate revisions in expectations of these key variables. It is been revealed by the study that the prices index increases when federal funds rate is increased. A similar research has

researched how stock market volatility impacts everyday consumers. Among them Garner (1988) researched how consumer spending in United States reacted to stock market crash of 1987. The study reveals that US consumer spending was reduced due to 1987 stock market crash.

Many researches have been done on relationship between macroeconomic variables and stock market for developed countries. Among them Kim, McKenzie and Faff (2004) researched links between macroeconomic announcements with the US bonds, Stock and foreign exchange market. The study applies GARCH model. It is been revealed by the study that US financial markets do not react to information released by the government. However the study reveals that the market react content of the news released. The study further reveals that the consumer and producer price information was found to be important driver of US stock markets.

Few Researches have been done on the linkage between stock market and macroeconomic variables in emerging markets. Among them Maysami, Howe, and Hamza (2004) researched the links between Singapore stock market and macroeconomic variables. The study applies Johansen's co-integration and vector error correction model. The selected macroeconomic variables for the study are interest rates, industrial production, price levels, exchange rate and money supply. The study examined the long term relationship between Stock Market Index (STI) and other selected indices with the selected stock market variables. It is been revealed in the study that there is short term and long term relationship between stock market and macroeconomic variables in Singapore.

The relationship between stock market and macroeconomic variables in India is researched by Naka, Mukherjee, and Tufte (1998). The study scrutinized relationship that selected macroeconomic variables have on Indian stock market. The study applies Johansen's co-integration and vector error correction model. It is been revealed in the study that domestic inflation has strong relationship with stock market. The study also reveals that domestic output growth is a predominant driving force of stock market in India. Similar research done by Kumar and Puja (2012) examine relationship between Indian Stock Market Index (BSE Sensex) and five selected macroeconomic variables. The study applies Johansen's co-integration and vector error correction model to explore the long-run equilibrium relationship between stock market index and macroeconomic variables. The selected macroeconomic variables for the study are production index, wholesale price index, money supply, treasury bills rates and exchange rates. It is been revealed by the study that macroeconomic variables have long term relationship with stock market prices in India.

Gay (2008) researched documented relationship between macroeconomic variables and stock market for four emerging markets. The selected four emerging markets for the study are Brazil, Russia, India and China. The selected macroeconomic variables for the study are exchange rate and oil prices. The study uses Box-Jenkins ARIMA model. The study reveals that there is no relationship between exchange rate and oil price on the stock market in Brazil, Russia, India and China. It is been revealed by the study that there is no significant relationship between present or past stock market returns. The study argues that stock market of Brazil, Russia, India and China is in weak form of market efficiency.

Among other research on emerging markets Gan, et al. (2006) researched New Zealand stock market. This study scrutinized relationship between New Zealand Stock Index and seven set of macroeconomic variables for 13 years. The study applies Johansen Maximum Likelihood and Granger-causality tests to establish the relationship between macroeconomic variables and stock market of New Zealand. It is been revealed by the research that the prices of New Zealand stock market is consistently determined by the interest rate, money supply and real GDP. The research also argues that New Zealand stock market can predict the directions of the economy.

a. Empirical Studies in Malaysia

In Malaysia context few researches have done to establish the relationship between stock market and macroeconomic variables. Ibrahim (2000) examines relationship between convention stock market and macroeconomic variables. The variables selected for the study are exchange rate, Money supply M2 and reserves. The study applies bivariate and multivariate co-integration and Granger Causality test. It is been revealed by the study that there is no long term relationship between stock prices and exchange rate when bivariate model is applied. The study further reveals that there is co-integration when model is extended to include m2 money supply and reserve. The study also reveals that Malaysia stock market is in informational inefficiency.

In a similar research Ibrahim and Yusoff (2001) researched relationship between Malaysian stock market and three macroeconomic variables. The three Macroeconomic variables selected for the study are real output; price level, money supply and exchange rate. The study applies co-integration and vector auto regression. It is been revealed by the research that Malaysian stock prices are driven by money supply. The study further reveals that money supply has positive effect on stock prices in the short run. However the study reveals that in the long run money supply has negative effect on

the stock prices. The study further reveals that stock prices contain valuables information for future volatility in the macroeconomic variables in Malaysia.

Other research has examined the relationship between different time periods. Baharom, Royfaizal and Habibullah (2008) examined pre and post Asian Financial crisis stock market relation between stock prices and macroeconomic variables of Malaysia. The selected macroeconomic variable is exchange rate. The study applies Johansen co-integration model. It is been revealed by the study that there is no long run relationship between stock prices and exchange rate in Malaysia.

The short run and long run relationship between stock market and macroeconomic variables of Malaysia is explored by different researches. Among them Rahman, Sidek, and Tafri (2009) research examined interactions between selected macroeconomic variables and stock prices in Malaysia. The selected macroeconomic variables are money supply, interest rate, exchange rate, reserves and industrial production index. The study applies Vector Auto Regression (VAR) framework. It is been revealed in the study that stock market index of Malaysia do perform a co-integration relationship with money supply, interest rate, exchange rate, reserves and industrial production. The study further reveals that when variance decomposition analysis is used Malaysian stock market has stronger dynamic interaction with reserve and industrial production index.

Some research has examined relationship between stock prices and one selected macroeconomic variables. Among them Ooi, et. al., (2009) has examined causality between stock prices and exchange rate for Malaysia and Thailand for pre and post Asian Financial crisis. The study applies Johansen-Juselius Con-integration test, dynamic causal relationship Toda-Yamamoto procedure, Variance Decomposition (VDC) analysis and Granger causality test. It is been revealed by the research that Malaysia stock prices is affected by the exchange rate in post crisis period.

In a similar research Abdullah, Saiti and Masih (2014) researched the causality between stock market index and macroeconomic variables in Malaysia. To establish the relationship the study investigates the lead-lag relationship between stock market index and macroeconomic variables. The selected macroeconomic variables are exchange rate, inflation, government bond yield, short term interest rate and exports. The study applies several conventional time-series techniques and wavelet analysis. It is been revealed by the study that a co-integration relationship does exist between stock market proxy used in the study Kuala Lumpur Composite Index (KLCI) and selected macroeconomic variables. The study further reveals that when error correction model, the generalized variance

decomposition analysis and wavelet cross correlation analysis are applied the short-term interest rate, KLCI and government bond yields are exogenous variables. The study further suggests that the short-term interest rate is the most leading variable.

Different researches have explored different aspects of the relationship. Among them Bekher and Mugableh (2012) research investigated equilibrium relationship between macroeconomic variables and Malaysian stock market index through bounds tests approach. The study examined relationship between Malaysian Stock Market Index (SMI) and macroeconomic variables. The selected macroeconomic variables are m3 money supply, exchange rate, GDP, Production Price Index (PPI) and Consumer Price Index (CPI). The study applies Ng and Perron (NP) bounds statistics test, bounds F-statistic test and Pesaran, Shin, and Smith (PSS) bounds tests Approach. It is been revealed by the study that macroeconomic variables have co-integration relationship with SMI.

Few researches have explored the relationship between macroeconomic variables and sharia index in Malaysia. Among them Hussin, et., al. (2012), researched the impact of oil price shocks on Islamic financial market in Malaysia. The variables selected for the study are Crude Oil Price (COP), Industrial Production Index (IPI), Consumer Production Index (CPI), Aggregate Money Supply (M3), Islamic Interbank Rate (IIR), Exchange Rate of Malaysian Ringgit-United States Dollar (MYR) and FTSE Bursa Malaysia Emas Shariah Index (FBMES). The study applies Vector Auto Regression (VAR) method and Granger causality test. It is been revealed by the study that Islamic stock prices of Malaysia is co-integrated with oil price and selected macroeconomic variables.

In a similar research Hussin, et., al., (2012), researched the relationship between oil price, exchange rate and Islamic stock market in Malaysia. The variables used in the study are Crude Oil Price (COP), Foreign exchange rates of Ringgit Malaysia - United States Dollar (MYR) and FTSE Bursa Malaysia Emas Shariah Index (FBMES). The study applies Vector Auto Regression (VAR) method, the co-integration analysis, Multivariate Granger causality test, Impulse Response Function (IRF) analysis and Variance Decomposition (VDC) analysis. It is been revealed by the study that Islamic stock prices are co-integrated with oil price and exchange rate variables. The study further reveals that the Islamic stock price is positively and significantly related to the oil price variable but inversely and not significantly related to the exchange rate variable. The study further reveals that oil price shock will affect the Islamic stock return in the short and long run in Malaysia.

Other researches have explored the impact macroeconomic variables have on other Islamic products in Malaysia. Among them Mobin and Masih (2014) have researched the impact that macroeconomic variables have on Islamic bank deposits of Malaysia. The variables selected for the study are Index Total Deposit in Islamic banks (TDP), Kuala Lumpur Composite Index (KLCI), Inflation rate (INF) and GDP. The study applies Auto Regressive Distributive Lag (ARDL) model. It is been revealed by the study that Inflation has strong impact on deposits of Islamic banking system. The study further reveals that GDP and Kuala Lumpur composite Index do not have significant impact on Islamic bank deposits of Malaysia.

It is evident from the literature that research on links between stock market and macroeconomic variables for emerging markets not well documented. The literature on Islamic Sharia stock market is very limited. The studies on relationship between stock market and macroeconomic variables have not used Auto Regressive Distributive Lag (ARDL) model. Therefore this study attempts to fill the gap in literature by examining the relationship of Sharia stock market and macroeconomic variables for an emerging market; Malaysia applying Auto Regressive Distributive Lag (ARDL) model.

b. Theoretical Underpinnings

Fama (1970) developed a theory Efficient Market Hypothesis. In this it is argued that in a strong form of market all the relevant information is reflected in the stock prices. The theory further argues that in an efficient market investors will not be able to earned abnormal profits. If this theory is applied changes to macroeconomic variables will not have impact of stock prices. However this theory is criticized in subsequent research by Fama and Schwert (1977) and Nelson and Schwert (1977). Many literatures have shown that macroeconomic variables have an impact on stock prices.

Markowitz (1952) Portfolio Theory established that rational investor will seek to maximize profit and minimize risk. This theory forms the foundation for the two important financial theories Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT). The two theories that form the foundation of many modern financial theories are Capital Asset Pricing Model (CAPM) developed by Sharpe, (1964), Lintner, (1965), Mossin, (1966) and Arbitrage Pricing Theory (APT) developed by Ross (1976). These two theories support that stock prices are affected from macroeconomic variables. The earliest study to empirically test Arbitrage Pricing Theory is Chen, Roll, and Ross (1986). The Chen, Roll, and Ross (1986) research established the links between macroeconomic

variables and stock prices in line of APT. This research provides basis to assume that there is a long run relationship between stock prices and macroeconomic variables.

Johansen and Juselius, (1990), Co-Integration test provides a model to examine the relationship between macroeconomic variables and stock market by testing co-integration between the variables. Engle and Granger (1987) Causality test another model to test the co-integration between macroeconomic variables and stock market by testing causality relationship between the variables. The bound tests Pesaran, Shin, and Smith, (2001) can be used to analyze the level relationships' between macroeconomic variables and stock market. Phillips and Ouliaris (1990) asymptotic properties of residual based tests can be used to test for co-integration between macroeconomic variables and stock market. The Auto Regressive Distributed Lag (ARDL) model can be used to test the presence of long run relationship between macroeconomic variables and stock market in an economic time series.

Islamic capital market has emerged as alternative to conventional finance. The risk and return concepts is different from the conventional concepts of finance. Global Islamic capital markets have expanded exponentially in the last decades. This growth is due to growing demand from Muslim investors and due to growth in value of Muslim investors. Islamic finance is not only popular among Muslim investors. Non-Muslims who invest in Islamic finance have also grown over the years. This is mainly due to stability Islamic finance provided during financial crises (Abbes, 2012).

The main feature that differentiates Islamic economy with the conventional finance is that Islamic finance does not allow activities that conflict with the principles of Islam. The main reason why Islamic Finance shows stability in hard times is that Islamic finance is based on five main principles. The five main principles that Islamic finance is based are prohibition of interest (*Riba*), prohibition of excessive uncertainty (*Gharar*), prohibition of speculation (*Maysir*), sharing of risk and return and prohibition of investing in *Haram* Activities or unethical activities (Abbes and Trichilli, 2015). These principles in Islamic finance prohibit investment in futures, options and other speculative based derivatives. The stability that Islamic finance products showed during financial crises was mainly due to specific characteristics of Islamic finance and the risk and return basis in Islamic finance. The collapse of US and European markets in Subprime loan mortgage crisis has attracted many investors to invest in Islamic financial products. The availability of wide range of Islamic capital market instruments such as Islamic stock, Sukuk and Islamic Mutual funds has helped to flourish Islamic finance economy across the globe (Omar, Abduh, and Sukmana, 2013).

Islamic stock market is an important instrument of Islamic finance. The products and activities in Islamic stock market are based on Shariah law. The Shariah compliant activities are approved in Malaysia by Figh Ulama. The main principles that Islamic stock market is established are preventing any practice of usury, sharing risks, prohibition of speculation and compliance of the *Akad* with the stated contract and activities that are in line with Sharia law (Hussin, et. al., 2012).

Even though Islamic Finance has emerged in last couple of decades, the classical contracts in Islamic finance has been in practice for centuries. The concepts of these contracts are derived from *Sunnah* and the practices from the Prophet Mohamed (ﷺ)'s community in *Madinah* (Saiti, Bacha, and Masih, 2014). The products like *Mushaarakah* and *Mudarabah* contracts are profit sharing contracts, *Al' bay Al Ajil Salam* and *Istisna* are financing contracts and *Ijara* are leasing products. These products have been in practiced for centuries. The new products that have emerged are *Al Ijarah Thumma Al Bai, Diminishing Musharakah, Parallel Salam* and *Parallel Istisna* contracts. These contracts are combination of classical contracts. The new Islamic financial products are introduced to meet the growing demand from the market. The Sharia law principles allow combining contracts to form a single financial product (Hussin, et. al., 2012).

Increasing popularity of Islamic finance has demanded researchers to examine Islamic stock market. However the literature on Islamic indices and Islamic stock market is thin compared to conventional counterpart. Therefore this paper attempts to fill the gap in literature by examining the impact that macroeconomic variables have on Islamic Sharia based index in Malaysia. This paper will help to establish Islamic economy when the findings show better understand on the Islamic stock markets.

3- Data

This paper investigates the dynamic causal linkage between Islamic stock market and four macroeconomic variables. The data used for this research is monthly observations covering nine years starting from October 2007, a total of 97 months.

The variables taken were FTSE Bursa Malaysia Emas Shariah Price Index (FTEEMS), Money Supply (MYM2), and Real Effective Exchange Rate (MYXR), crude oil(oil) and KLIBOR (Klibor. All the data were taken from the Thomson Reuters DataStream.

4- Methodology

The paper uses ARDL approach proposed by Pesaran and Pesaran (1997), and Pesaran, Shin, and Smith (2001) to examine the relationship between Sharia Index and selected variables. This approach is commonly used to investigate the long-run links between variables. In comparison with other known co-integration methods, the ARDL approach allows different optimal lags for the variables, and is a very useful tool since it substantially improves the small-sample properties of the estimates regardless of the nature of the time series, stationary or not.

This approach is different from the conventional methods, which requires for unit root pre-testing before carrying out the co-integration tests. Another feature of substantial importance of the ARDL approach is that it can be applied even for small sample size, and allows getting simultaneously the short-term and long-term estimates.

First, the paper conducted ADF, PP, KPSS tests to examine the stationary of the variables in the series. Then, the paper performed diagnostic tests to ensure the validity of the regressions used for the implementation of the bounds test approach of co-integration among the variables.

Based on the co-integrating relationships, we computed the long run and short-run elasticity to assess the causality direction between variables and to check the return to the long-run equilibrium based on the estimated error correction model. Finally, given the obtained results of the ARDL approach, we also employed other suitable econometric approaches; such as variance decomposition and impulse response to ensure that, our findings are not contingent upon only one approach.

A simple model is used to examine the relationship.

The functional form of the model is as follow:

FTSEEMS = f (MYM2, MYXR, OIL,KLIBOR)

Where

FTSEEMS = FTSE EMAS Shariah Index

MYM2 = Money supply 2

MYXR = Exchange rate

OIL = Crude oil

KLIBOR= Kuala Lumpur Inter Bank Offer Rate

5- Results and Discussion

We begin our empirical testing whether the variables chosen are stationary or non-stationary. Before applying ARDL model testing unit root of the time series very important to proceed with the co-integration testing later, the variables should be in I(1) form which means that in their level forms it should be non-stationary and in differenced form it should be stationary.

This can be done by using Augmented Dickey-Fuller Unit Root Test (ADF), Phillips-Perron Test (PP) and KPSS test.

The results of the 'ADF, 'PP' and 'KPSS' Unit Root Tests of four variables are documented and shown in Tables 1, 2 & 3.

Table 1: ADF Unit Root Test

LEVEL FORM OF VARIABLES					
VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT
LMYXR	ADF(4) = AIC	205.99	0.85	-3.37	Non-Stationary
	ADF(1) = SBC	200.53	0.15	-3.49	Non-Stationary
LMYM2	ADF(1) = AIC	300.87	-0.34	-3.49	Non-Stationary
	ADF(1) = SBC	295.85	-0.34	-3.49	Non-Stationary
FTSEEMS	ADF(3) = AIC	175.03	-3.11	-3.43	Non-Stationary
	ADF(1) = SBC	168.58	-2.47	-3.38	Non-Stationary
LOIL	ADF(2) = AIC	85.44	-2.87	-3.48	Non-Stationary
	ADF(2) = SBC	79.16	-2.87	-3.48	Non-Stationary
LLIBOR	ADF(2) = AIC	177.15	-3.16	-3.48	Non-Stationary
	ADF(2) = SBC	170.87	-3.16	-3.48	Non-Stationary
FIRST DIFFERENCE OF VARIABLES					
VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT
DMYXR	ADF(5) = AIC	204.16	-2.30	-2.90	Non-Stationary
	ADF(1) = SBC	198.96	-6.76	-2.91	Stationary
DMYM2	ADF(1) = AIC	298.44	-7.00	-2.91	Stationary
	ADF(1) = SBC	294.70	-7.00	-2.91	Stationary
DFTSEEMS	ADF(1) = AIC	172.63	-5.47	-2.94	Stationary
	ADF(1) = SBC	168.75	-5.47	-2.94	Stationary
DLOIL	ADF(4) = AIC	83.28	-5.23	-2.83	Stationary
	ADF(1) = SBC	78.63	-4.75	-2.91	Stationary
DLIBOR	ADF(1) = AIC	171.40	-3.66	-2.91	Stationary
	ADF(1) = SBC	167.65	-3.66	-2.91	Stationary

Table 2 PP Unit Root Test

LEVEL FORM OF VARIABLES				FIRST DIFFERENCE OF VARIABLES			
VARIABLE	T-STAT.	C.V.	RESULT	VARIABLE	T-STAT.	C.V.	RESULT
LMYXR	0.49	-3.38	Non-Stationary	DMYXR	-8.94	-2.94	Stationary
LMYM2	-1.74	-3.38	Non-Stationary	DMYM2	-9.56	-2.94	Stationary
FTSEEMS	-1.84	-3.45	Non-Stationary	DFTSEEMS	-8.30	-2.96	Stationary
LOIL	-1.45	-3.38	Non-Stationary	DLOIL	-6.68	-2.94	Stationary
LLIBOR	-1.93	-3.38	Non-Stationary	DLIBOR	-7.45	-2.94	Stationary

Table 3 KPSS Unit Root Test

LEVEL FORM OF VARIABLES					FIRST DIFFERENCE OF VARIABLES				
VARIABLE	T-STAT.	C.V.	C.V.	RESULT	VARIABLE	T-STAT.	C.V.	C.V.	RESULT
LMYXR	0.15	0.14	0.005	Non-stationary	DMYXR	0.14	0.14	-0.01	Non-Stationary
LMYM2	0.12	0.14	-0.026	Stationary	DMYM2	0.10	0.14	-0.05	Non-Stationary
FTSEEMS	0.09	0.14	-0.047	Stationary	DFTSEEMS	0.09	0.14	-0.05	Non-Stationary
LOIL	0.12	0.14	-0.025	Stationary	DLOIL	0.12	0.14	-0.02	Non-Stationary
LLIBOR	0.10	0.14	-0.037	Stationary	DLIBOR	0.09	0.14	-0.05	Non-Stationary

The results of unit root tests the result are not consistent, it varies from one test another test.

From unit root test table (1, 2 & 3), it can easily deduced that all the variables, we are using for this analysis are I(0) or I(1). Therefore, the most appropriate technique to analyze long run relationships among the variables are, the ARDL co-integration technique, developed by Pearson *et al.* (1996, 2001).

VAR Lag Order Selection

Before continuing with the co-integration among the variables, we have to determine the optimal order of the vector auto regression (VAR). We choose the optimal order of VAR on the basis the highest SBC values.

Optimal Order		Values	Adjusted LR (p-Value)	C.V.
2	**AIC**	945.1906	[.260]	5%
1	**SBC**	898.9503	[.008]	5%

Cointegration

In order to check the co-integration status among the variables, we applied the F-test.

Table 4: F-Statistic results

Variable	F-Stat	Critical Value Lower Bound	Critical Value Upper Bound
FTSEEMS	4.98	2.65	3.81
MYXR	2.92	2.65	3.81
MYM2	2.19	2.65	3.81
OIL	2.78	2.65	3.81
klibor	2.02	2.65	3.81

From the Table 4, it is shown that there is at least one *F value* that is greater than the upper bound critical values. This means that co-integration is established among the variables is not spurious. This indicates that each variable contains information for the prediction of other variables. The economic implication of this result are that the variables Emas Shariah Index (FTSEEMS), Money Supply (MYM2), Exchange Rate (MYXR), Crude Oil (Oil), Interest Rate (KLIBOR) are moving together in a particular direction in the long run. Meaning a long run relationship exists between the macroeconomic variables and Emas Shariah Index (FTSEEMS). However, these results are the beginning and we need more evidence of co-integration among the variables of interest.

The co-integration does indicate how the short-run adjustments process takes place to long run equilibrium. For understanding that adjustment process we need to go for the error-correction model.

Error Correction Model (ECM) representation

For the ECM's representation for this ARDL model is selected based on SBC criterion. The reason we are choosing SBC criterion is it has a tendency in turn leads to smaller estimated standard errors. The ECM represents the speed of adjustment to restore equilibrium in the dynamic model after following a disturbance.

Table 5: Result of Error Correction Model Based on SBC

Result of Error Correction Model Based on SBC			
Variable	**Coefficient**	**Standard Error**	**P- Value**
ecm1(-1) dFTSEEMS	-0.29	0.06	[.000]*
ecm1(-1) dMYM2	0.00	0.01	[.695]
ecm1(-1) dMYXR	-0.08	0.05	[.106]
ecm1(-1) dOIL	-0.25	0.06	[.000]*
ecm1(-1) dklibor	-0.17	0.05	[.002]*
Note: * denotes significant at 5 percent level			

At least one of the ECM should be significant for the validity of the co-integrating relationship among the variables in the long term. The test shows three variables of the coefficient of ECM with the negative sign and significant at 5% level. This confirms the existence of a stable long-run relationship and points to a long-run co-integration relationship between variables.

The coefficient of the ECM for Shariah index is -0.29; this implies that a deviation from the long run equilibrium following a short-run shock is corrected by about 29 percent after one month. The coefficient of the ECM for Crude oil is -0.25; this implies that a deviation from the long-run equilibrium following a short-run shock is corrected by about 25 percent after one month. The coefficient of the ECM for KLIBOR is -0.17; this implies that a deviation from the long-run equilibrium following a short-run shock is corrected by about 17 percent after one month. The t ratio and P *value* of the coefficients of the variables indicate whether the effects of these variables on the dependent variable are significant or not in the short-run. This shows whether the dependent variable is endogenous or exogenous. The paper finds that the Crude oil and KLIBOR have significant effects on the Shariah Emas index.

In addition to the diagnostics of all the equations of the error, correction model the paper tested the

stability of the coefficients by the plots of "Cumulative Sum of Recursive Residuals (CUSUM)" and "Cumulative Sum of Squares Recursive Residuals (CUSUMSQ)" tests, which are presented in Figure 1 and 2. The result showed that there was a structural break during the period covered for this analysis; this could be the reason for problem of normality in the equations. However, we did not include a dummy variable to correct the problem.

Figure 1: Plot of Cumulative Sum of Recursive Residuals (CUSUM)

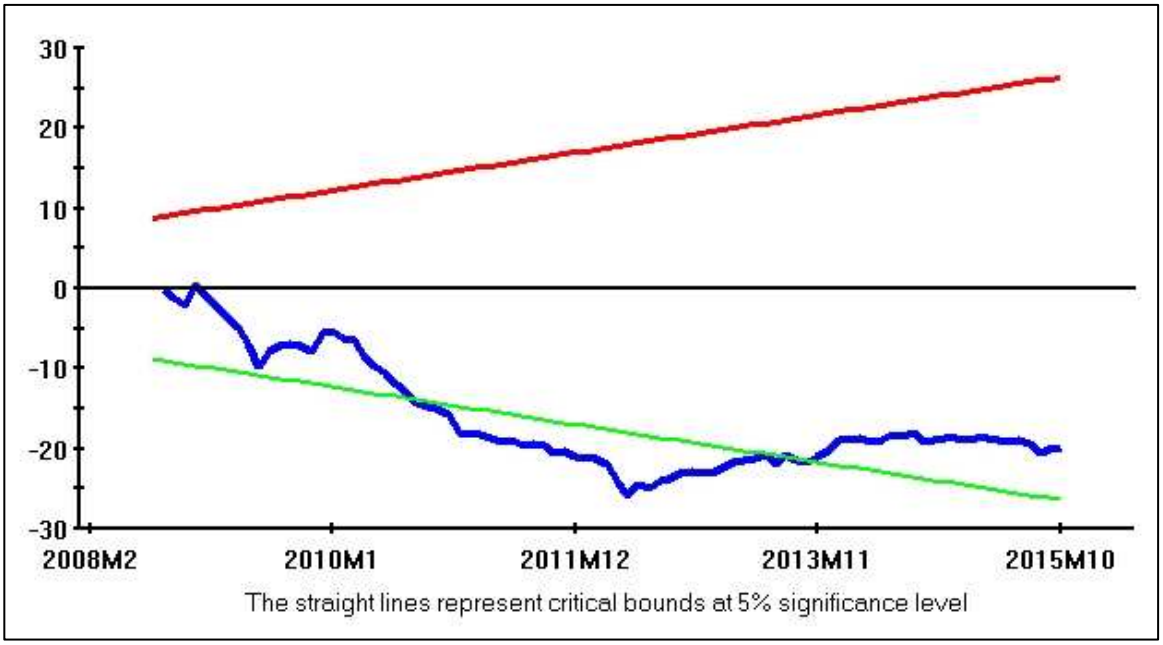
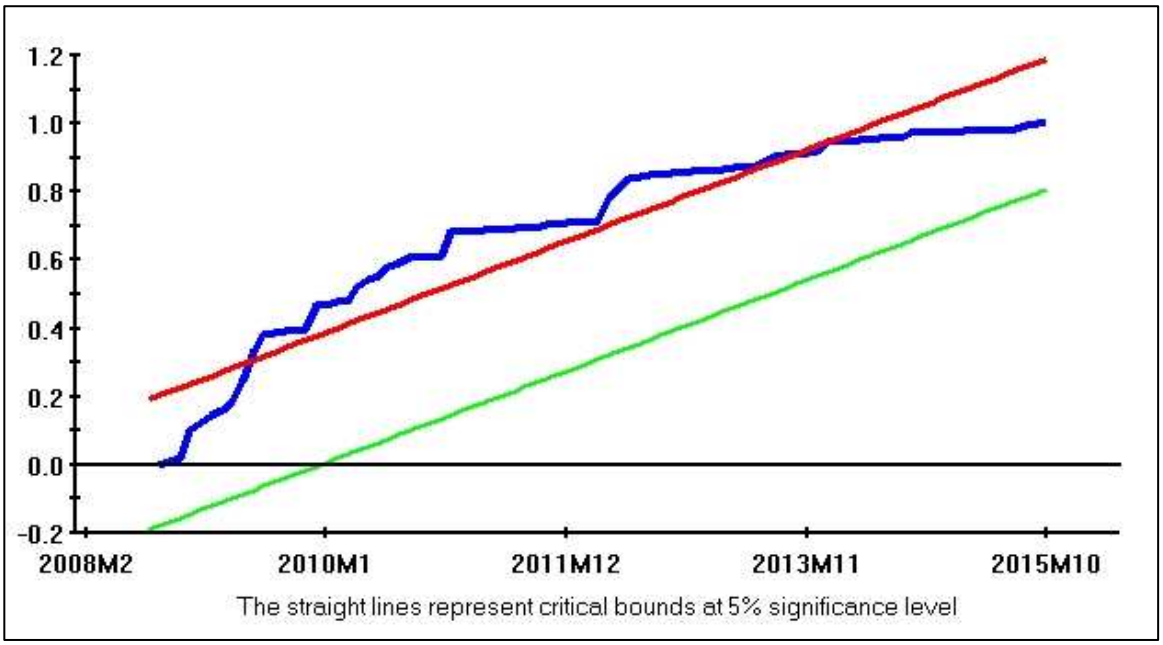


Figure 2: Plot of Cumulative Sum of Squares of Recursive Residuals (CUSUM SQUARE)



Variance Decompositions (VDC)

Normally, the investors and policy makers would be interested to know the exogenous variable because they can closely monitor the performance of that particular variable as it would have significant effect on the expected movement of other variables. By knowing exogenous and endogenous variable, the investors and policy makers can make a better forecasting for their investment or new policy to be implemented.

The error correction model manages to indicate which variable is exogenous and which variable is endogenous. However, it cannot specify the relative degree of Exogeneity and Endogeneity of the variables. Therefore, to discern this issue we applied variance decomposition (VDC). The proportion attributable to shocks from each variable can determine the relative Exogeneity or endogeneity of a variable in the system, including its own. The most exogenous and the least endogenous variable is the variables whose variation is explained mostly by its own past variations.

The Orthogonalized VDCs depend on the particular ordering of the variables in the VAR, and it assumes that when a particular variable is shocked, all other variables in the system are switched off. Therefore, we rely on Generalized VDCs, which are invariant to the ordering of variables and more reliable than Orthogonalized VDC to identify the most exogenous variable and most endogenous variable.

TABLE 6: Generalized VDC (4 year)

Variables	Horizon	DFTSEEMS	DMYM2	DMYXR	DOIL	DKLIBOR
DFTSEEMS	48	86.58%	5.64%	0.54%	0.88%	6.36%
DMYM2	48	1.55%	93.72%	0.30%	1.39%	3.04%
DMYXR	48	1.89%	6.44%	79.86%	10.83%	0.98%
DOIL	48	0.11%	1.01%	9.05%	88.60%	1.23%
DKLIBOR	48	4.14%	4.38%	0.79%	4.80%	85.90%

TABLE 7: Generalized VDC (8 year)

Variables	Horizon	DFTSEEMS	DMYM2	DMYXR	DOIL	DKLIBOR
DFTSEEMS	96	86.58%	5.64%	0.54%	0.88%	6.36%
DMYM2	96	1.55%	93.72%	0.30%	1.39%	3.04%
DMYXR	96	1.89%	6.44%	79.86%	10.83%	0.98%
DOIL	96	0.11%	1.01%	9.05%	88.60%	1.23%
DKLIBOR	96	4.14%	4.38%	0.79%	4.80%	85.90%

From table 6 and table 7, the results of Generalized VDC have been summarized in the below table by ranking for different horizons.

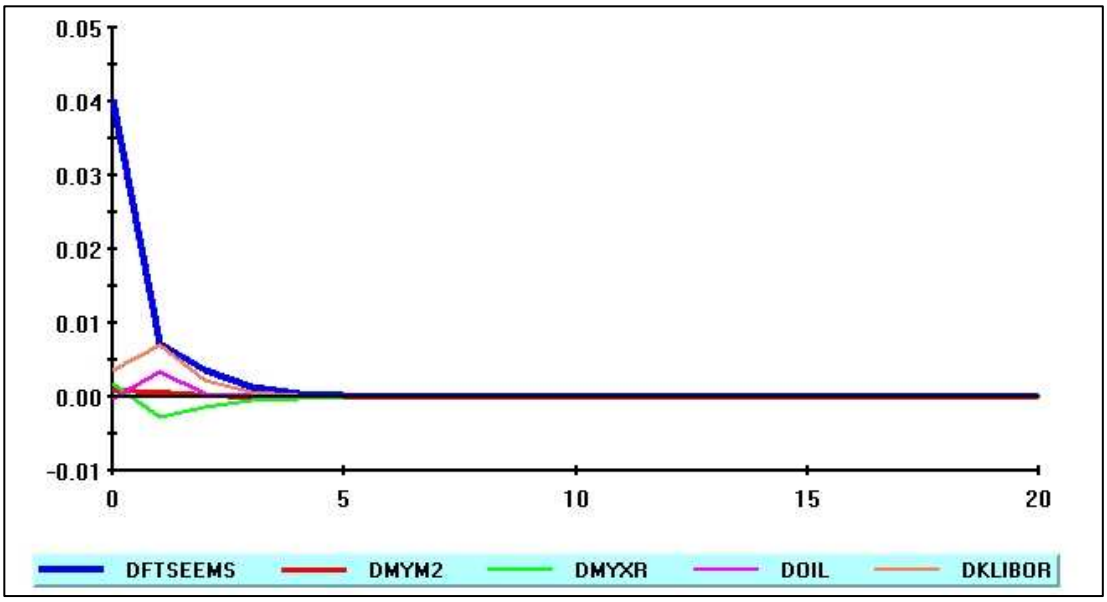
NO.	Variable
1	MYM2
2	OIL
3	FTSEEMS
4	KLIBOR
5	MYXR

The result indicates that Money Supply (MYN2) is the most exogenous, followed by Crude Oil (OIL), FTSE Bursa Malaysia EMAS Shariah index (FTEEMS) and Interest Rate (KLIBOR). The least exogenous or in other words, the most endogenous variable is Malaysian exchange rate (MYXR). It is surprising to see that Malaysian exchange rate MYXR is the least exogenous or in other words, the most endogenous variable since it is the variable that has been shocked by the government in 1998 during the financial crisis.

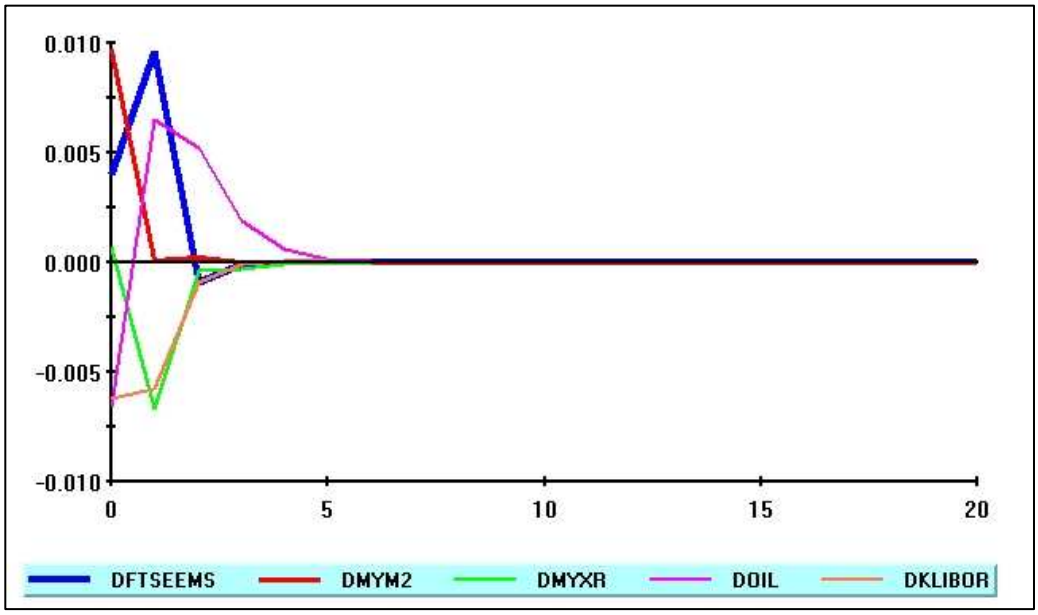
Impulse Response Analyses Result

The impulse response functions (IRFs) essentially produce the same information as the VDCs, except that they can be presented in graphical form Orthogonalized and Generalized forms. We started out applying Generalized IRF and obtained the following results. The IRFs essentially map out the dynamic response of a variable owing to one period standard deviation shock to another variable.

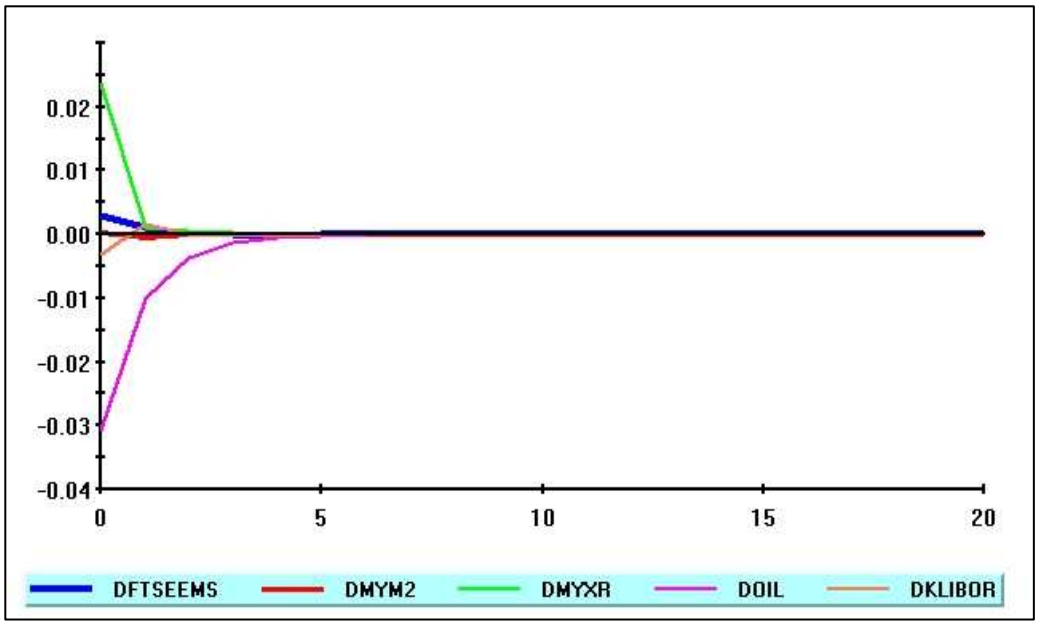
1. **Figure 3-Generalized Impulse Response(s) to one S.E. shock in the equation for LFTEMS**



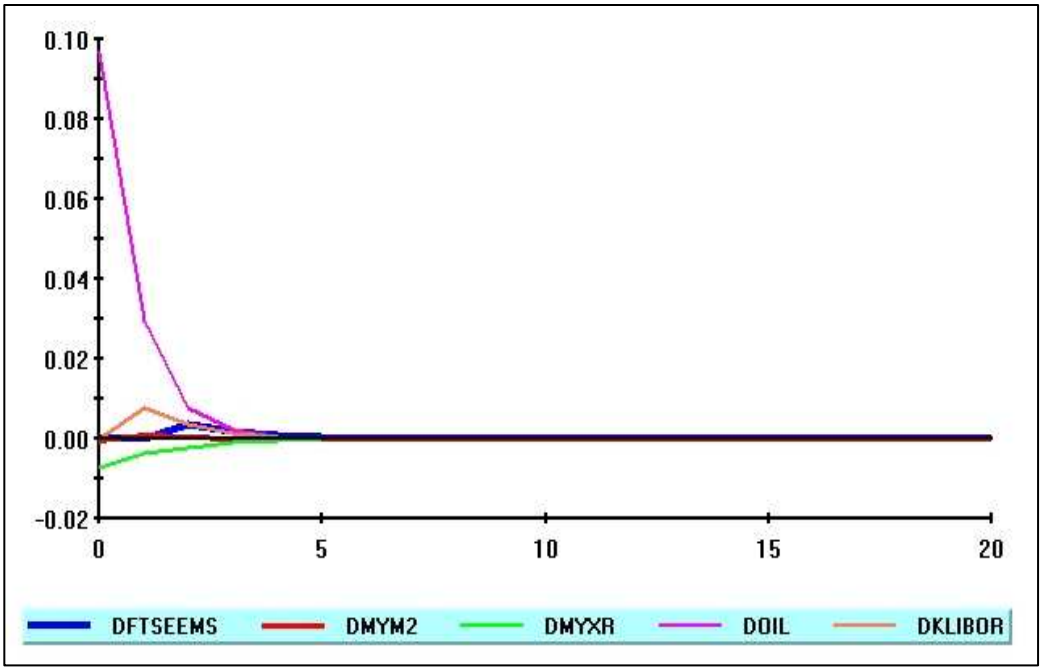
2. **Figure 4- Generalized Impulse Response(s) to one S.E. shock in the equation for DMYM2**



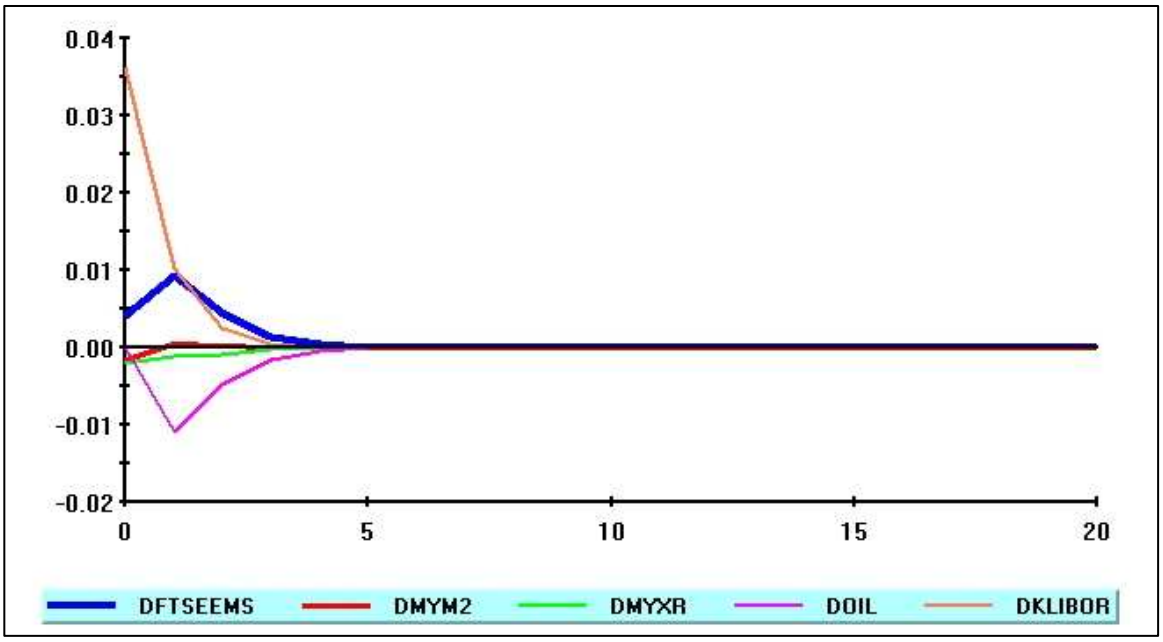
3. **Figure 5- Generalized Impulse Response(s) to one S.E. shock in the equation for DMYXR**



4. **Figure 6- Generalized Impulse Response(s) to one S.E. shock in the equation for DOIL**



5. **Figure 7- Generalized Impulse Response(s) to one S.E. shock in the equation for DKLIBOR**



6- Conclusion and Policy Implication

The result of ARDL model shows that Sharia Index and four selected macroeconomic variables; Money Supply, Exchange Rate, Oil Price and Interest rate have a long term cointegrating relationship. The Result of ECM shows that Oil price and interest rate have long-term relationship between sharia indexes in Malaysia. The result of VDC shows that Money Supply and Oil price are the driving force of Shariah Index in Malaysia.

These results show that Islamic capital market is also not immune to the financial crises. However due to the risk and return principles in Islamic financial products gives stability to the economy. The result of the research shows that policy makers can predict the direction of the economy from Shariah Index in Malaysia.

This study is a recent update on literature linking Islamic capital market and macroeconomic variable of an emerging market; Malaysia. Therefore this study contributes to literature as latest addition on the subject matter. This study enhances the literature on the impact that macroeconomic variables has on the Islamic stock market. This will enhance knowledge on academia's understanding on the macroeconomic variables and Islamic stock market.

The results of the findings will help investors to evaluate the best time to diversify stocks to Islamic stocks. It will also help investors predict asset prices and the direction that economy is heading.

As the result shows that there is a long-term relationship between Shariah Index and selected macroeconomic variables it will help policy makers to formulate policies to stabilise the economy and financial systems. This will also help the investors and businesses to reduce risk because they will understand the economy better. The study helps policy makers to understand the role of Islamic stock market as an economic indicator.

The study also helps investors to create a better diversified portfolio because with the help from the results investors will have better understanding of systematic risk in the macroeconomic variables. The study also helps students, teachers and lecturers as the study is a recent update on the subject matter and will have better understanding on relationship between Islamic stock market and macroeconomic variables.

The policy markers can adjust policies on macroeconomic variables when they know the direction of the economy. The desired results of the variables can be achieved by predicting the direction of the economy by analysing the Shariah Index in Malaysia. This will help policy markers to stabilise the economy and financial system of the country.

This study recommends that; Policy makers, financial policies and investors, need to take the macroeconomic indicators into account when formulating financial and economic policies and, diversification and structuring of the portfolio. The study will help the investors to make investing and diversification decisions when they can predict the direction of the economy by examining Sharia Index in Malaysia.

The present study is limited to only four selected macroeconomic variables including more variables with a longer time period may improve the results. Including more variables and different types of Islamic stock indices can show a reasonable extension of this study.

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